R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE CLAIMS

Claim 1 has been amended to incorporate the subject matter of claims 2 and 4, which have been canceled.

In addition, claims 3, 7, and 8 have been amended to accord with amended independent claim 1.

Still further, claims 1, 3, 7, and 8 have also been amended to make some clarifying improvements to more clearly recite the features thereof in better form for issuance in a U.S. patent.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

THE PRIOR ART REJECTION

Claims 1-3, 6, 7, and 10 were rejected under 35 USC 103 as being obvious in view of the combination of JP 05-175598 ("Yagi") and JP 57-109387 ("Umeo"); claims 11-16 were rejected under 35 USC 103 as being obvious in view of the combination of Yagi, Umeo, and USP 5,038,352 ("Lenth et al"); claims 4, 5, 8, and 9 were rejected under 35 USC 103 as being obvious in view of the combination of Yagi, Umeo, and USP 6,593,602 ("Liang et al"); and

claim 17 was rejected under 35 USC 103 as being obvious in view of the combination of Yagi, Umeo, Lenth et al, and Liang et al. These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

A purpose of the present invention as recited in claim 1 is to provide a super luminescent diode (SLD) which has a broad optical spectral luminescence characteristic, with the center wavelength in a range from approximately 800 nm to approximately 850 nm, and which has a spectral half bandwidth that is greater than or equal to a predetermined value.

In the super luminescent diode recited in amended independent claim 1, at least one of the well layers has a layer thickness within a range from approximately 2.5 nm to approximately 5nm; the at least one of the well layers is formed from an $In_{xa}Ga_{(1-xa)}As$ film, where a composition ratio xa of the In is within a range from approximately 0.05 to approximately 0.20; and the at least one well layer is formed as a strained well layer having a lattice distortion which has a value within a range from approximately 0.35% to approximately 1.5%.

With this structure, it is possible to achieve a super luminescent diode which can stably obtain a more preferable luminescence characteristic or amplifying characteristic within a wavelength range whose center wavelength is in a range from approximately 800nm to approximately 850nm, as compared with a

prior art semiconductor optical device. See, for example, the disclosure in the specification at page 8, line 25 to page 9, line 5, and at page 9, lines 17-24.

Yagi discloses a semiconductor laser which uses a InGaAs well layer, wherein the thickness of the well layer is 3 nm, a composition ratio of the In is 0.03, and the oscillation wavelength is 780 nm. (See paragraphs [0012] and [0018].) In addition, Yagi discloses that by either selecting the layer thickness or the composition ratio, oscillation with a wavelength of about 750nm-980nm becomes possible.[1] (See paragraph [0020].) According to Yagi, moreover, keeping the impurity concentration of the active layer below $2x10^{17}cm^{-3}$ improves reliability. (See paragraph [0013] and Fig. 3.) Thus, Yagi discloses that the composition ratio of the In is 0.03. (Paragraph [0012].)

By contrast, according to the present invention as recited in amended claim 1, a composition ratio xa of the In is within a range from approximately 0.05 to approximately 0.20. And it is respectfully submitted that (contrary to the Examiner's assertion at the bottom of page 2 of the Office Action), Yagi does not disclose this feature of claim 1.

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[1]Yagi does not, however, disclose numerical values of the composition ratio or suggest improvement of a super luminescent diode (SLD). If fact, Yagi relates to a semiconductor laser, not to a super luminescent diode (SLD) as recited in claim 1.

It is respectfully pointed out, moreover, that the present invention as recited in claim 1 is directed to a super luminescent diode (SLD). By contrast, Yagi relates to a semiconductor laser and does not suggest the goal of achieving a broad optical luminescence characteristic, which goal is achieved by the structure recited in claim 1. A semiconductor laser generates coherent light. A super luminescent diode (SLD), on the other hand, generates non-coherent light. Thus, Yagi relates to a completely different structure than claim 1.

In addition, with respect to Yagi, there is a problem that the effect of band isolation (pushing away a band having a larger effective mass in a direction parallel to the interface of the well layer among two bands degenerated at the valence band ends, to a relatively higher level by energy viewed from a hole) by a compression strain cannot be sufficiently desired since the composition ratio of the In is low. The present application, by contrast, discloses a suitable range of the composition ratio xa of the In (0.05 - 0.20) and a suitable range of the thickness of the well layer (2.5-5nm) in order to achieve a broad optical spectral luminescence characteristic in an SLD. See, for example, page 41, line 18 to page 46, line 4 of the present application.

Umeo discloses a semiconductor emitting-device having a well layer with a different bandgap. The semiconductor emitting-

device of Umeo was inspired by trying to effectively use the leakage carrier, and by collocating multiple layers of well layers with different bandgaps, Umeo is trying to generate multiple or a continuous wavelength within a given range. It is respectfully pointed out, however, that by merely collocating different band gap layers, the emission wavelength only travels in series with the increase of the current density (see Fig. 3). And it is respectfully submitted that the structure of Umeo does not effectively achieve a broad optical spectral luminescence characteristic as recited in claim 1.

Liang merely discloses the general structure of a super luminescent diode (SLD), and does not disclose or suggest the features of claim 1 whereby at least one of the well layers has a layer thickness within a range from approximately 2.5 nm to approximately 5nm, and the at least one of the well layers is formed from an $In_{xa}Ga_{(1-xa)}As$ film, where a composition ratio xa of the In is within a range from approximately 0.05 to approximately 0.20.

And Lenth et al, moreover, was cited only with respect to claims that have now been canceled, and does not disclose or suggest the structure recited in claim 1.

In view of the foregoing, it is respectfully submitted that the present invention as recited in amended independent claim 1,

and claims 3, 7, and 8 depending therefrom, clearly patentably distinguishes over the cited references, taken in any reasonable combination, under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

/Douglas Holtz/

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